REMARKS

As described herein, Applicants have cancelled claims 36 and 40, amended claims 21, 22, 27, 32, 33, 37, and 41 and added new claim 42. Applicants note with appreciation the Office's indication that claims 7-13 15-17, 19-20, 27-31, 36 and 40 would be allowable if rewritten in independent. In view of the following amendments and remarks, Applicants hereby request further examination and reconsideration of the application, and allowance of claims 1-35, 37-39, and 41-42.

The Office has objected to claims 21 and 32 asserting the claim language should be changed to "the number of the first and second channels are identical." Accordingly, Applicants have amended claims 21 and 32 in accordance with the Office's suggestion. In view of the foregoing amendments and remarks, the Office is respectfully requested to reconsider and withdraw the rejection of claims 21 and 32.

The Office has rejected claims 1-6, 14, 18, 22-27, 33-35, 37-39 under 35 U.S.C. 102(b) as being anticipated by the article "Multi-spectral color reproduction research at the Munsell Color Science Laboratory" to Berns et al. ("Berns") and has rejected claims 21, 32, and 41 under 35 U.S.C. 103(a) as being unpatentable over Berns in view of U.S. Patent No. 5,949,914 to Yuen ("Yuen"). The Office asserts that Berns discloses: capturing high spectral resolution data of at least a first portion of a first scene using a first plurality of channels (page 16, section 3, note that the first plurality of channels could be 61 channels); determining a first set of channels (minimum number of channels) from a second plurality of channels which can reconstruct spectral of the first portion of first scene (page 16, section 3, page 18) to satisfy a first error criterion when compared with the captured high spectral resolution data (Fig. 1, page 15-16, section 3, note that the error criterion is the least-square); and capturing pixel data of at least a second portion of at least first scene using the first set of channels (page 16-18, section 3, note that capturing or reconstructing at least a portion of pixel data is inherent when the portion of the image is reconstructed). The Office also asserts that Berns does not explicitly mention the number of first and second channels or subsystems are identical, but asserts that Yuen in FIG. 9a discloses using multiple identical channels or sub-imaging systems.

Neither Berns nor Yuen, alone or in combination, disclose or suggest, "determining a first set of channels from a second plurality of channels which . . . satisfy a

first error criterion" as recited in claim 1 or "a spectral processing system that determines a first set of channels from the second plurality of channels which . . . satisfy a first error criterion" as recited in claim 22. Contrary to the Office's assertions, computing the least-square matrix M as disclosed on page 16 of Berns is not the same as determining a first set of channels from a second plurality of channels which satisfy a first error criterion. Computing least squares will simply identify a function where the sum of the squares of the distances of the points from the function is at a minimum, but that does not determine whether that identified function satisfies a first error criterion. That function may be the minimum, but still may not satisfy a chosen criterion for an acceptable error for the spectral image capture. As a result, other numbers and or combinations of channels may need to be identified and tested to determine if the first error criterion is satisfied to ensure the desired level of spectral image quality. As discussed in paragraph 23 on page 7, lines 19-25 of the above-identified patent application, "The spectral processing system 14 performs an iterative optimization determining a matrix which when applied to the captured pixel data from a set of channels, the closest reconstruction of the highly accurate spectra may be realized. The set with the smallest number of channels which can approximate the highly accurate spectra across all captured pixels within an average spectral RMS difference that is less than the error tolerance e is chosen as the optimal set." Accordingly, the present invention does not just identify the set with the smallest number of channels, but determines the set with the smallest number of channels that also satisfies the chose error tolerance. Thus, in view of the foregoing remarks, the Office is respectfully requested to reconsider and withdraw the rejection of claims 1 and 22. Since claims 2-21 depend from and contain the limitations of claim 1 and claims 23-32 depend from and contain the limitations of claim 22, they are distinguishable over the cited references and are patentable in the same manner as claims 1 and 22.

With respect to independent claims 33 and 37, the Office has indicated that dependent claims 36 and 40 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Accordingly, Applicants have amended claim 36 to substantially incorporate the subject matter of claim 33, have amended claim 37 to substantially incorporate the subject matter of claim 40, and have cancelled claims 36 and 40. Accordingly, in view of the foregoing remarks, the Office is respectfully requested to reconsider and withdraw the rejection of claims 33 and 37. Since claims 34 and 35 depend from and contain the limitations of claim 33 and claims 38, 39, and

41 depend from and contain the limitations of claim 37, they are distinguishable over the cited references and are patentable in the same manner as claims 33 and 37.

As discussed earlier, the Office has objected to claims 7-13 15-17, 19-20, 27-31, 36 and 40 as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In view of the foregoing remarks and amendments regarding the independent claims 1, 22, 33, and 37, these dependent claims are now believed to be in condition for allowance. Accordingly, the Office is respectfully requested to reconsider and withdraw the objection to claims 7-13 15-17, 19-20, 27-31, 36 and 40.

In view of the above amendments and the following remarks, reconsideration of the outstanding office action is respectfully requested. Pursuant to 37 CFR § 1.121, attached as Appendix A is a Version With Markings to Show Changes Made.

In view of all of the foregoing, applicants submit that this case is in condition for allowance and such allowance is earnestly solicited.

Respectfully submitted,

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Date 2/26/03 — Sherri A. Moscato

Appendix A

Version With Markings to Show Changes Made

In reference to the amendments made herein to claims 21, 22, 27, 32, 33, 37, and 41, additions appear as underlined text, while deletions appear as bracketed text, as indicated below:

In The Claims:

Please cancel claims 36 and 40, amend claims 21, 22, 27, 32, 33, 37, and 41 and add new claim 42 as follows:

21. (Amended) The method as set forth in claim 1 wherein the number of the first plurality of channels and the second plurality of channels are identical.

22. (Amended) A system for spectral imaging, the system comprising:

[a first] an imaging [sub-system] system that captures high spectral resolution data of at least a portion of a first scene using a plurality of channels; and

a spectral processing system that determines a first set of channels from the second plurality of channels which can reconstruct spectra of the portion of the image to satisfy a first error criterion when compared to the captured high spectral resolution data, wherein [a second] the imaging [sub-system] system captures pixel data of the scene using the first set of channels.

27. (Amended) The system as set forth in claim 22 wherein the spectral processing system compares at least once the high spectral resolution data for a second portion of a second scene against the estimated spectral resolution data captured using the first set of channels for the second portion of the second scene to determine an intermittent error, the spectral processing system determines a second set of channels from the second plurality of channels which can reconstruct spectra of the second portion of the second scene to satisfy the first error criterion when compared to the captured high spectral resolution data if the intermittent error is greater then a second error tolerance, and the [second] imaging [sub-system] system captures pixel data of at least a portion of any remaining portion of at least the second scene using the second set of channels.

32. (Amended) The system as set forth in claim 22 wherein the number of the first plurality of channels and the second plurality of channels are identical.

33. (Amended) A method for spectral imaging, the method comprising:

capturing a first high spectral resolution data of at least a first portion of a first scene using a plurality of channels;

capturing pixel data of at least a second portion of a first scene using a first set of channels from the first plurality of channels;

determining a first transform based on the first set of channels and the first high spectral resolution data; [and]

generating an image of the first scene using the transform and the captured pixel data[.];

capturing high spectral resolution data of at least a second portion of a second scene using a plurality of channels;

applying the first transform to the pixel data from the first set of channels to the second portion of the second scene to produce spectral estimates;

compare the spectral estimates to the high spectral resolution data to dètermine an intermittent error; and

determining a second transform based on the first set of channels and the second high spectral resolution data if the intermittent error is greater than a first error tolerance.

37. (Amended) A system for spectral imaging, the system comprising:

a first imaging sub-system that captures a first high spectral resolution data of at least a first portion of a first scene using a plurality of channels;

a second imaging sub-system that captures pixel data of at least a second portion of a first scene using a first set of channels from a plurality of channels; and

a spectral processing system that determines a first transform based on the first set of channels and the first high spectral resolution data generates the image of the first scene using the transform and the captured pixel data[.] ;

wherein the first imaging sub-system captures high spectral resolution data of at least a portion of a second scene using a plurality of channels and wherein the spectral imaging system applies the first transform to the pixel data from the first set of

channels of the at least a portion of the second scene producing spectral estimates, compares the spectral estimates to the high spectral resolution data to determine an intermittent error and determines a second transform based on the first set of channels and the second high spectral resolution data if the intermittent error is greater than a first error tolerance.

41. (Amended) The system as set forth in claim 37 wherein the first and second imaging sub-system are the same imaging system.

-- 42. The system as set forth in claim 22 wherein the imaging system further comprises:

a first imaging system that captures the high spectral resolution data of at least the portion of the first scene using the plurality of channels; and

a second imaging system captures the pixel data of the scene using the first set of channels. --